A Proposal for an Alternative Standards Setting Process

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ABSTRACT

The article unveils and discusses some of the internal and external forces that shape standardization. What would happen if it were solely up to the market to standardize? What are the motivations behind corporate activities in standards setting, which are, after all, costly and tend to be frustratingly slow? Why would users want to have standards? Answers to these questions are given, based on a critical literature review, combined with insights obtained from a survey. Finally, a proposal for a new standards setting process is made that takes all these issues into account.

A BRIEF INTRODUCTION

Standardization may have far-reaching impact on companies and even on full-grown economies. Betting on a technology that eventually fails to become a market standard may well, for example, lead to the breakdown of a company. For vendors and service providers this means that the pros and cons of joining the standardization bandwagon vs. trying to push a proprietary solution need to be considered. Standards-based products or services may imply price wars and lower revenues, but may also open new markets and widen the customer base. Offering a proprietary solution may yield (or keep, rather) a loyal customer base, but may also result in technological lockin and, eventually, marginalization.

Users, on the other hand, have very different reasons for using standards-based systems. These include avoiding technological dead ends and minimizing the risk of being stranded with an incompatible technology. Specifically, this implies the wish to reduce dependence on vendors. To promote universality is yet another aspect; seamless information interchange both internally and with external partners is far easier to achieve if everyone uses standards-based systems, thus eliminating the need for gateways or other translation devices.

Accordingly, the crucial issues include how to select the "right" standard and how to standardize on the "right" system. "Right", of course, means different things to different people, which is why standardization tends to be very tricky; what is right for one company may be disastrous for another. The international and possibly global scale of standards, especially in the field of information and communication technology (ICT), means that players with very different backgrounds from very different economies need to agree on something they deem to be at least more or less right.

It is easy to imagine that producing standards in such a diverse environment, where stakes are potentially extremely high, is not a trivial task. On top of the technical problems to be solved, corporate strategies and even individual preferences and beliefs of the group members play a crucial role. Those three aspects may, of course, be interlinked. This is why standards setting is a cumbersome and slow activity, with a vast variety of stakeholders (vendors, service providers, users, software companies, consultants, administrations, etc.) from different corporate backgrounds and with equally different needs and requirements, and characterized by compromise and hidden agendas. However, a standards body's working group is virtually the only reasonable meeting place for all these stakeholders.

There are several alternatives for how to set standards. One option is to work through a standards developing organization (SDO) or a consortium. Alternatively, one could let the market do the standardization work. This option and its potential consequences are briefly addressed. We also discuss the impact corporate strategies may have on standardization and propose a new model for the standards setting process, which aims at closer cooperation between the different stakeholders in the process. A brief conclusion is provided as well.

MARKET STANDARDIZATION

Let us imagine what might happen if the market had to decide which technology to standardize. Several results are possible, one, of course, being that an optimal technology (or at least the best alternative available) actually wins. There is no need to discuss this case further.

There are other possible outcomes, though. Consider, for example, a situation where different but roughly equivalent technologies are

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available, none of which commands sufficient support to establish itself as the "standard." It may now well happen that this uncertainty paralyzes the market, and that potential buyers postpone their purchases in order not to invest in a losing technology (this happened, e.g., during the early days of LAN development). As a consequence, innovation in that technical domain would come to a near standstill. Clearly, nobody benefits from a situation like this.

Path Dependencies

The notion of *uncertainty* is important here. Standards are but a part of a larger socio-economic system, which exerts a certain amount of influence on standards development. For example, the more recent need for new technologies to be environmentally sound made nuclear power less desirable in many parts of the world. That is, a standard is subject to path dependencies imposed on it by its broader environment. Unforeseen, indeed unforeseeable, developments may hamper all efforts and even impose the need to start an activity all over again from scratch. Moreover, in most cases a standard is not a standalone document. Rather, it is positioned in a network of other standards (some of them possibly only emerging) that influence the boundary conditions within which it can emerge by laying down, for example, stringent compatibility requirements. Last but not least, early decisions made during the standardization of a technology itself may have significant impact on later decisions. Selecting the telephone network as the carrier for facsimile transmissions, for example, implicitly predefined numbering schemes to be used and possible transmission speeds, as well as the need to eventually switch from analog to digital transmission technology. More generally, decisions made at an early stage of the process to a considerable degree shape subsequent developments.

From Acorns to Oaks

It should be obvious that hardly any sufficiently accurate forecasts can realistically be made regarding future developments. While this uncertainty affects all predictions, it has a particularly strong impact on standardization. Here, big oaks from minor acorns grow. That is, comparably small events may carry great weight; in the absence of a sound basis for judgment and decisions, the adoption of a particular technology by just one firm may encourage others to follow suit. If this happens, chances are that an inferior technology will be adopted, which may suit the initial adopter (who will have evaluated the alternatives and selected the technology to best suit his needs) but does not necessarily meet other entities' demands. They, in turn, will then make their choices solely based on the initial adopter's policy decisions. Little if any experimentation with alternative technologies or systems will occur, which will rapidly be discarded. The DOS operating system was a case in point: one strong player, IBM, chose this system, which did not really represent the state of the art even at that time, and almost all others followed suit. Obviously, IBM gained significant profits from this development — as did, even more so, Microsoft. In fact, to some extent users gained as well, albeit not from superior technology, but solely from the emerging network externalities.

A similar effect may be observed when a decision to adopt is based only on an initial expressions of a technology (e.g., an early implementation of an IT system). In such cases, a poor first implementation can easily reduce a technology's chances of being adopted, since possibly superficial implementation-specific shortcomings hide the technology's inherent advantages. The same holds for inadequate initial specifications. For example, a couple of years back the adoption of the X.400 email system suffered severely from an incomplete first specification, as major parts were left "for further study."

Likewise, observable early benefits of a technology will outweigh all other aspects; in particular, higher benefits to be gained at some later stage from a different technology will be ignored. Indeed, these benefits again cannot be identified at all due to the lack of opportunities for experimentation. It follows that the market can — and frequently will — adopt the "wrong" technology when left on its own. Wrong, like right, is of course a vague term; a technology may appear to be right for a particular adopter, but at the same time the adoption may have negative impacts on others.

Consequently, some form of coordinated standardization effort is required. (Prospective) standards reduce uncertainty by aligning players' views and expectations. Indeed, the existence of an ongoing standards setting process might suffice to prevent the purely market-led development outlined above, as it would then be possible to raise expectations that a standard will soon be emerging from this process.

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The Committee Standardization Process

Corporations and Standardization

It is no big surprise that, at least initially, the major players in the ICT field were very reluctant when it came to open standardization. With large customer bases for their proprietary systems they had little incentive to open up this lucrative market to competitors; IBM in the '60s and '70s is a case in point. Such dominant companies, which control the market or at least major segments of it, stand to lose the most from openly available standards. More recently, however, even major players seem to realize that their products hardly stand a chance of dominating an ever growing and increasingly competitive market. Strategic alliances are formed with producers of complementary products, users, and competitors. Even arch competitors (e.g., SUN and Microsoft) have agreed to cooperate in certain areas to enable the development of de facto standards. Ultimately, the desire to open up markets has in many cases led to the formation of consortia. Frequently, their major, and maybe only, goal is the establishment of open specifications that may eventually be submitted to one of the "official" SDOs for consideration and formal approval.

After all, significant increases in market shares — and thus potential gains — may be at stake when a product stands to be ennobled by becom-

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ing a standard. At the same time this is the ground on which turf wars within working groups and committees flourish. Obviously, it all comes down to the question of competition vs. cooperation. Regrettably, trying to prevent a standard at all may also be a motivation for participation.

Users are the ultimate major sponsors of standardization, through their purchases of systems incorporating standards. Accordingly, one might assume that they are keen to secure a reasonable return on investment, that is, to make sure that standards — and thus the systems they buy and use — provide the functionality they need. However, earlier research indicates that this is not really the case [1]. Users appear to be quite happy to live with proprietary systems, in many cases assuming that those systems represent the "real" standard; that is, they are the ones most widely implemented (MS Windows/Office and SAP systems are cases in point). Here, the benefits derived through networking effects (including those to be gained from a large number of third parties providing compatible products) may outweigh all other considerations. This, in turn, means that users are less than motivated to go to any length to influence standards setting; off-the-shelf systems or custom-made solutions hold the promise of faster or better solutions to current problems. In many cases this is a shortsighted approach, but one still followed by many companies. That is, we are currently allowing the market to standardize — not a healthy state. In fact, these days users even adapt their business processes to make them meet the capabilities of commercial enterprise resource planning (ERP) systems — thus somehow reversing the whole idea of standards.

Still, the desire to make sure that the right standard emerges is normally the reason for firms' involvement in the standards setting process. However, what exactly characterizes the right, or at least a good, standard is far from being clear. For instance, most users of a particular IT service (email) were not able to identify meaningful requirements, even after over a decade of service usage [2]. This warrants certain doubts about the quality of a speedily done specification, which will, in all likelihood, be based on completely unverified requirements, potentially far off the mark. Moreover, to meet economic and societal requirements should clearly play a role in standards setting as well. Standardization may thus be seen as an interface between technical and nontechnical considerations. That is, standards are not only rooted in technical deliberations, but also result from a process of social interactions between the stakeholders (particularly including governments and user/vendor companies). These dynamic interactions are projected onto the standardization bodies' committees, where another dimension is added, that of the individual.

The Need for Compatibility

Globalization may have further impact on standards setting. Besen claims that market growth may well lower the need for compatibility, and that variety may be possible without a negative impact on market growth. He goes on to argue that variety itself may be a source of growth [3]. This is a dangerous proposition. Pushing it only a small step further we will find companies introducing variety purely for (their own) growth's sake. Indeed, there is likelihood that companies will follow strategies of deliberately introducing incompatibilities to tie customers to their systems. If this happens, there will be an urgent need for other entities to counter such moves by backing alternative compatible proposals. To add weight and credibility to this move, this alternative system could be introduced into the standardization process.

If no compromise can be achieved when competing proposals exist, one possible outcome will be the formation of a new consortium established by one of the rival entities. This might also be an explanation for the alarming expansion of the number of "standards" consortia. A "Balkanization" of the standardization process, with competing bodies developing competing specifications, is a likely result, which would further contribute to a deliberate introduction of incompatibilities.

Indeed, interworking units (e.g., gateways) may contribute to lasting incompatibilities as they enable information exchange across, and maybe even interworking between, heterogeneous (i.e., incompatible) networks, albeit typically with a loss of some functionality or information. While good gateways may offer a higher level of interoperability, it must be noted at the same time that the better the gateways, the more they serve to entrench incompatibility. Here, little motivation exists to go to great lengths to install an overall compatible standards-based system since potential gains seem to be comparably small thanks to the good gateways. An almost comic touch is added to this situation when gateways themselves become the subject of standardization efforts.

Personal Dynamics

Schmidt and Werle [4] claim "The common engineering background of most committee members is likely to lead to a cooperative situation where all participants will work towards the 'best' technical solution." This assessment is a bit oversimplistic. While most committee members indeed have an engineering background, they do not necessarily solely strive for technical brilliance. Rather, they tend to see themselves as company representatives. This holds particularly for members from user companies. Accordingly, they will only contribute specific requirements that originate from their respective environments. It follows that here the local environments of the respective user representatives' organizations have a major impact on standards setting in heavily influencing the user requirements that are actually fed into the process.

Also, efforts of the different stakeholders — for example, commitment demonstrated through their willingness to prepare high-quality proposals and to take over important responsibilities in the committee — are important factors. Likewise, the technical, diplomatic, and political capabilities of their representatives must not be underestimated. These commitments and capabilities create asymmetries within the committees, which influence the standards setting process [5].

COSTS OF STANDARDS

Standards setting is a costly business. It has been estimated that the costs for the development of an average IT standard amount to about $10,000,000 [6] — and that is only one standard. Another estimation says that development cost for a "major international telecommunications standard" may amount to some 1000 person-years of experience, 20 person-years of actual effort, plus $3 million [7]. Joint Technical Committee 1 (JTC1)[1] alone has produced between 40 and 50 standards per year over the last decade.

Thus, standards setting bodies would seem to be well advised to sell any planned activity to those who would actually have to carry most of the financial burden and may be expected to be most interested in the final product. This includes particularly vendors and users. It is they who need to be convinced of the benefits to be gained from the proposed standard setting activity, and that it is in their best interest to participate and commit resources to it.

Apart from genuine interest, funding — or rather the lack of it — is of particular importance, particularly to the user community. In fact, it is one of the most prominent explanations for users' abstention from standardization. Active involvement in standardization not only demands regular participation in meetings; additional time for preparation is also required. A standard worker will not be available to his/her employer for a considerable length of time if the engagement is taken seriously, thus incurring major expenses. Various suggestions have been made on if and how funding should be provided to increase participation, especially from users. Views differ widely in this respect; some claim that no special funding needs to be made available to users because they are already adequately represented on the committees. Others argue that additional funding should be made available by interested parties (e.g., governments) to enable and promote participation, especially of smaller users.

In any case, it should be in everyone's interest to make sure that all interested and potentially affected parties should be in a financial position to participate in standards setting if they wish to do so.

AN ALTERNATIVE STANDARDS SETTING PROCESS

These days we are moving away from standards for the purely technical aspects (i.e., for a communication network), and up to areas that are affected by existing business processes (e.g., in the e-commerce domain). As a consequence speed is no longer the overriding issue for many standards setting activities. Rather, the standards bodies in charge will have to make sure that a standard emerges that is useful for as many stakeholders as possible, and will continue to be so for a long period of time.[2] Likewise, it should be sufficiently certain from the outset that the standard can be integrated into possibly very different business processes. Moreover, economic viability of a standard should be established prior to the actual standards setting work. Given the huge amounts of money that have to go into the development of a single standard it would be disastrous if it failed to deliver. This requires a standards setting process different from the one employed today. One such process, the *cyclic stage model of standardization (CSMS)*, is depicted in Fig. 1.

The model draws on ideas from participatory design [8]. This is an approach to the assessment, design, and development of (technological) systems, encouraging the active involvement of potential or current end users in the processes. In fact, the standards setting process will hardly work properly without equal and balanced participation of all interested parties and without a common understanding of the problems and issues at hand. This holds for both phases of the model.

This is a two-stage process, with an analysis stage preceding the technical work. During the former, a first compilation and verification of initial requirements from both the technical and business perspectives is performed, the required resources are secured, and, if applicable, it is ensured that a window of opportunity will be met.

Several fundamental decisions need to be made before the actual (technical) standards setting work can commence. First of all, it is crucial to realize the impossibility of solving all potential future problems from the outset, and accordingly not to try and specify an all-embracing set of standards. Recent experiences, such as the ill-fated open systems interconnection (OSI) initiative, show that attempts to specify such standards are bound to fail (hardly any OSI-related standards survived in the marketplace, X.509 being one notable exception). Accordingly, an evolutionary approach should be adopted, where work is based on a set of initial requirements, specified primarily by those who will actually use the system in the future. At a latter stage, the specification can be refined and based on real-world experience.

Having assembled the initial requirements list, its individual items have to be weighed with respect to their perceived importance, and potential contradictions have to be resolved. Finally, a catalog of mandatory requirements has to be agreed on to serve as the basis for the subsequent technical work. In the likely absence of well-founded strong requirements during the early stages of the process, additional requirements will be added and possibly removed as work progresses and practical experience is gained.

Likewise, it needs to be considered if, and to what degree, the new standard may cause changes to an already installed base. If it does, the nature and extent of these changes must be evaluated carefully. Again, a step-by-step approach to the introduction of changes is highly recommended, which particularly implies that only very few components of a network may be replaced at a time, and that an alignment phase has to follow each such change before another replacement may be done [9]. Ensuring backward compatibility is a closely related major issue here. Accordingly, a transition strategy needs to be advised as well.

Based on the requirements compiled, technical groups would then attempt to develop a draft specification, which is returned to the user representatives for review and, eventually, approval. Ideally, the engineers drafting the specifications

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[1] The International Organization for Standardization/International Electrotechnical Committee's (ISO/IEC's) JTC1 is in charge of IT standards developed jointly by these two standards setting bodies.

[2] Electronic data interchange (EDI) is a good example here. Proprietary systems emerged in the '60s; standards activities commenced in the '70s and are still continuing. Meanwhile, over 1000 standards have been produced.

The group of user representatives should be composed of engineers as well as non-technical people to make sure that all facets of the requirements are met. There may be several iterations, with the proviso that a balance is maintained between evaluation and development.

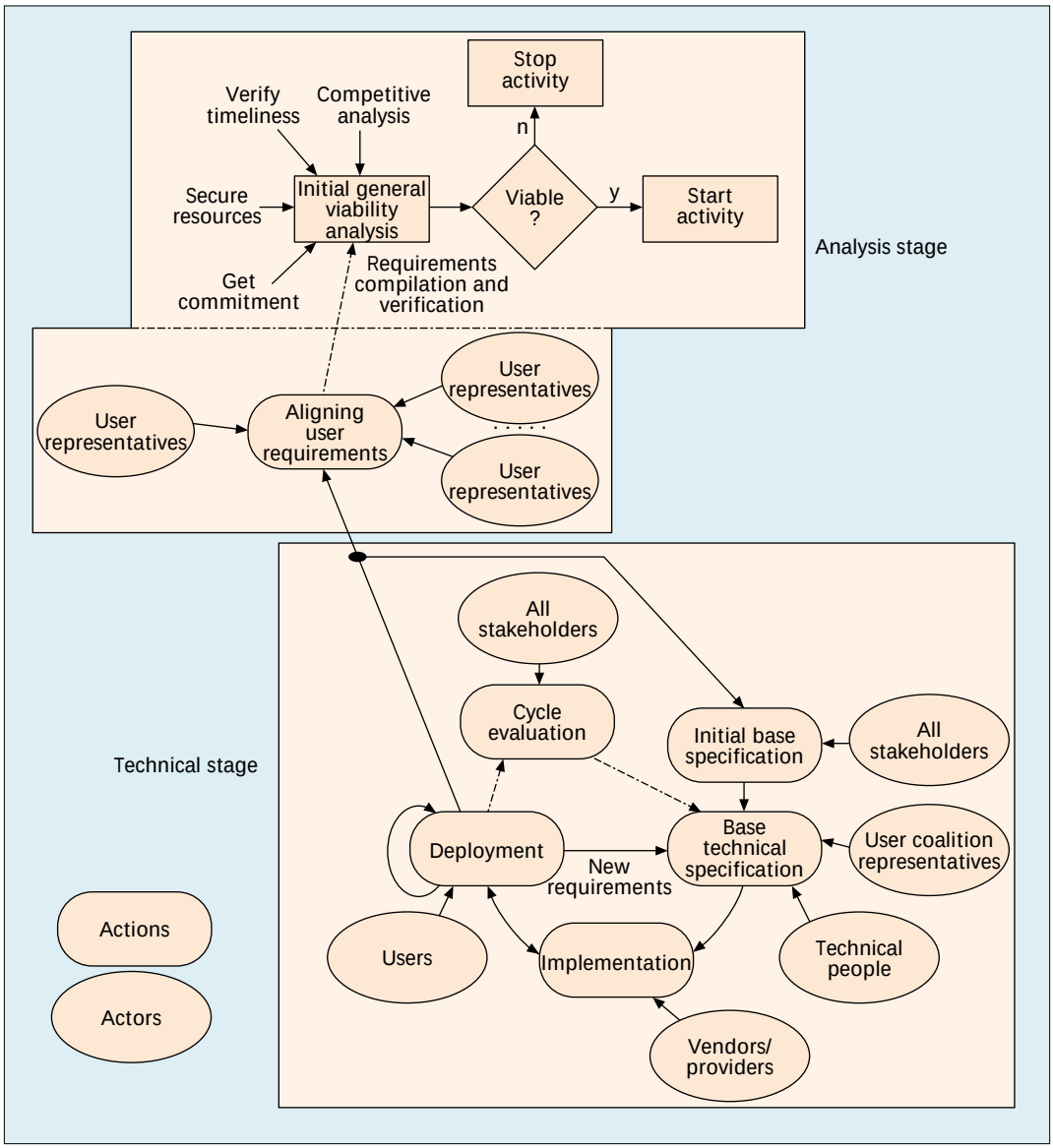

Figure 1. *The cyclic stage model of standardization.*

would come from both sides, vendors and users, since this would help to keep the specifications in line with the requirements available. The group of user representatives should be composed of engineers as well as nontechnical people to make sure that all facets of the requirements are met. There may be several iterations, with the proviso that a balance is maintained between evaluation and development. Subsequently, the first version of the final specification can be released for implementation.

Inadequate such first versions of a standard may lead to unfavorable perception. With CSMS, close cooperation between vendors and users during the technical work should guarantee that even initial specifications are solidly based on real-world requirements. This cooperation should also prevent excessively complex specifications. Moreover, since the process is very adaptive, potentially relevant new technical developments and emerging new requirements can easily be integrated.

During the following deployment phase, operational experience will be gained within a variety of user environments. Here, it is important that the new system be integrated into actual business processes (as opposed to merely being a prototype). Eventually, the experience accumulated will be sufficient to identify shortcomings of the specification. The resulting additional requirements will serve as input to a second technical cycle, during which the specifications will be revised accordingly. This approach has to some degree been borrowed from the usability domain, where "learning by using" is a popular way of identifying usability deficiencies in a software system [10].

Some Brief Final Remarks

By now, most standards setting organizations have realized that their processes and procedures for standardization in the IT domain are no longer in line with market needs. Solutions vary, though. For example, for quite a while now, the European Telecommunications Standards Institute (ETSI) has been moving away from the traditional committee approach toward

a project-oriented one. The ISO has introduced a fast track and the notion of publicly available specifications, aimed at a faster procedure and better deployment of externally developed specifications, respectively. Both ISO and the International Telecommunication Union (ITU) have been improving their relations to consortia and, particularly, the Internet Engineering Task Force (IETF) in order to streamline and harmonize standards development efforts.

However, none of these organizations has changed its basic process. Speed as such is still considered desirable per se, the influence of the user community is still extremely limited in practice, and incorporation of real-world experiences, which would help bring standardization work closer to real needs and thus to the market, is not an issue for any of them. As a consequence, consortia and industry fora are becoming increasingly important, despite their weaknesses (limited and costly participation and thus exclusion of many, typical dominance of big players, limited consensus and due process, etc). Moreover, many consortia and fora are temporary, and after an enthusiastic initial phase suffer from reduced attendance. Several are trying to merge to reduce cost and enhance the attendance. However, this is not to say that consortia are superfluous or of little value; many do extremely valuable work, which complements the formal bodies' activities.

The ongoing market globalization, with its increasing number of corporate mergers, is a showcase for the value and necessity of global standards. But not only do standards need to be in place, they must also address the requirements of their various users and reflect the needs of the market in general. As a consequence, we need on one hand an improved process for each individual standards body, and on the other a model for better cooperation between the individual bodies as well. Efforts are underway here, and there seems to be a light at the end of the tunnel, but more remains to be done to put the limited resources available to optimal use.

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